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by the American Geographical Society · Broadway at 156th Street, New York 32 · Dayton Jack — 3-1951

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VOL. II, NO. 3, November 15, 1951

Outlook for Wood

Wood is the world's most widely used industrial raw material, its third most important fuel, the source of nearly all its paper and of most of its packaging materials. But wood is more: it is the raw material for a great range of chemically synthesized products, from radio recording tape to inner soles for shoes, from photographic papers to bituminized sewer pipes.

It has, indeed, been stated that if the Nazis had been successful, as they almost were, in obtaining control of adequate wood supplies, Germany would have been well-nigh blockade-proof. But important as wood has been in war, and may, alas, again be, its greatest role is still to be played in the multiple enrichment of human life in peace. Throughout the world the quantity of industrial wood and wood products used per person is one of the major indexes of economic development; by doubling the amount of wood used in the poorer countries, their living standards could be raised astonishingly.

At first sight such a statement may seem exaggerated, for when we think of industrial development, we usually think first of iron, coal, and the lighter alloys. Only at second thought are we likely to remember such universally distributed products as photographic film, rayon, and other wood-based synthetics, or the huge quantities of carton and paper packaging needed in our daily life, or the giant tonnage of pulp required to produce newspapers and periodicals.

In measuring the world-wide utilization of timber, we have to rely on well informed guesses, for accurate reports are available from but half of the wood-producing regions. In 1949 the world's total production of roundwood was estimated at 1,397 million cubic meters,* weighing about one billion metric tons. More wood was used, by weight, than any other raw material except coal.

More than two-thirds of this output never reached a sawmill or pulpmill. About 57% was burned as fuel, and some 12% became miscellaneous products other than lumber or pulp—hewn wood for pit props and railroad ties, wood for distillation into alcohol, for the extraction of tanning agents, and for many other specialized uses.

Of the remaining 31% of the 1949 cut, about three-fourths was converted by sawmills into lumber, veneer, and plywood, destined to become everything from lettuce crates to the seamless sheaths of airplane wings; and the rest was made into pulp for paper, paperboard, and synthetics.

But, as may be seen in the accompanying table, continents and countries differ widely in their uses of wood. In South America, Africa, Asia, and parts of Europe and the U.S.S.R., fuelwood bulks many times larger than construction and industrial timber; in North America the balance is tipped the other way.

* 1 cubic meter equals 35.3 cubic feet.

Equally striking are the differences in rates of consumption. Not only does the average North American use almost 20 times as much wood a year as, for instance, the Asian, but more than three-quarters of it comes to him processed by industry, whereas more than half the Asian's meager supply is burned as fuel.

Among the individual countries the contrasts are even greater: the highest level of wood consumption per person, 6.94 cubic meters in Finland (1949), is nearly 700 times the 0.01 cubic meter available in Iran.

The value of forests as sources of wood cannot, of course, be gauged by mere acreage. Aside from such factors as accessibility to transportation and the skill devoted to their management—when they are managed at all—the most important consideration is the kinds of wood produced.

As indicated on the map, the world's woods and forests are of three main types, each with its special commercial uses: softwoods, temperate hardwoods, and tropical hardwoods. Softwoods are obtained from trees botanically classified as gymnosperms (bare-seed trees). They are the conifers—such as pine, fir, spruce, and larch—and 95% of them are in the Northern Hemisphere. They cover vast areas today, and covered even more before man began his long agricultural and industrial expansion. Softwood timbers have proved the most adaptable for many purposes, notably construction, packaging, the manufacture of pulp for paper and for many products of chemical conversion; and coniferous forests have been for generations the mainstay of the world's large-scale wood industries.

Hardwoods are produced by the broad-leaved trees, botanically classified as angiosperms (covered-seed trees), which include both deciduous trees of temperate climate, such as oak, elm, and beech, and tropical species, such as mahogany, greenheart, and balsa. Most temperate hardwoods are actually hard and have long been chosen for their strength, and sometimes their beauty, for use as beams, ship's timbers, cabinet woods, and the like; but in tropical forests only about a third of the woods are hard and heavy (some, such as ironwood, are so hard that they will turn nails), another third are soft and light (some, such as balsa, are lighter than cork), and the rest are intermediate.

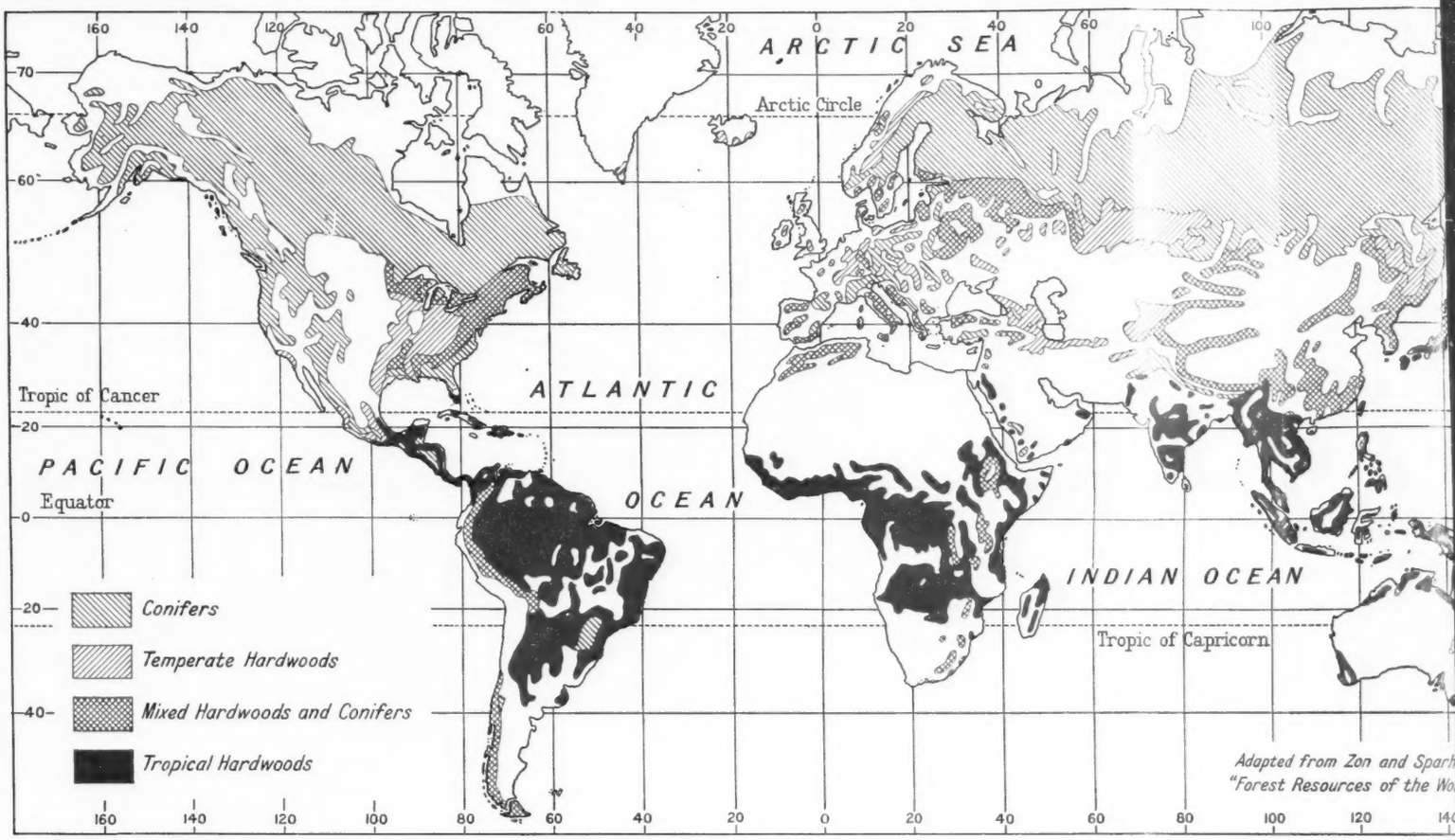
As long as the accessible forests in the Northern Hemisphere were superabundant, the tropical forests that cover much of South America, Southeast Asia, and tropical Africa were left almost untouched by the timber industry, except for highly selective "treasure hunts" for a few prized cabinet or other special-purpose woods. Research into the commercial possibilities of most types of hardwoods, both temperate and tropical, lagged far behind that of the softwoods. But in recent years the drain on coniferous timber has led to a new interest in exploring the potentialities of hardwoods, tropical as well as temperate. Tropical species, however, aside from the exceptions referred to, still play a small part in the international timber trade.

The probabilities now point to a marked upward spiral in total world demand for wood, a demand that will fall increasingly on heretofore neglected areas. The greatest single timber-importing area, Western Europe, and its greatest timber-importing country, the United Kingdom, formerly drew their imports chiefly from Northern and Eastern Europe and the U.S.S.R. Since World War II, imports from Russia have greatly decreased and also those from the other countries of Eastern Europe, partly because of the rising industrial demands at home. At present the only continent with a net export surplus of timber is North America—which means, in fact, Canada—and the amount currently available is wholly inadequate for world needs.

In order to fill an estimated unsatisfied annual demand of at least 700 million cubic meters of roundwood, the volume of world production reached in 1949 would have to be increased 50%. This, however, would merely bring the world average to the present level of five fairly prosperous but forest-deficient countries—Switzerland, Denmark, New Zealand, Malaya, and Uruguay—chosen by the Food and Agriculture Organization of the United Nations as in general fairly typical of their respective regions but enjoying above-average purchasing power.

There are, of course, big differences even in potential demand between various countries and regions, but, aside from military requirements, there are in all countries demands for new housing and industrial construction, for continually increasing quantities of paper and carton, and for expanding wood technologies. And there is need, too, to replace materials from nonrenewable sources with substitutes that can be produced indefinitely. All these factors point to a steadily enlarged role for wood and its products.

Use of wood on the lavish scale of North America, Finland, and Sweden is perhaps not likely to be duplicated outside the great forested areas. But North



Forest Resources of the World

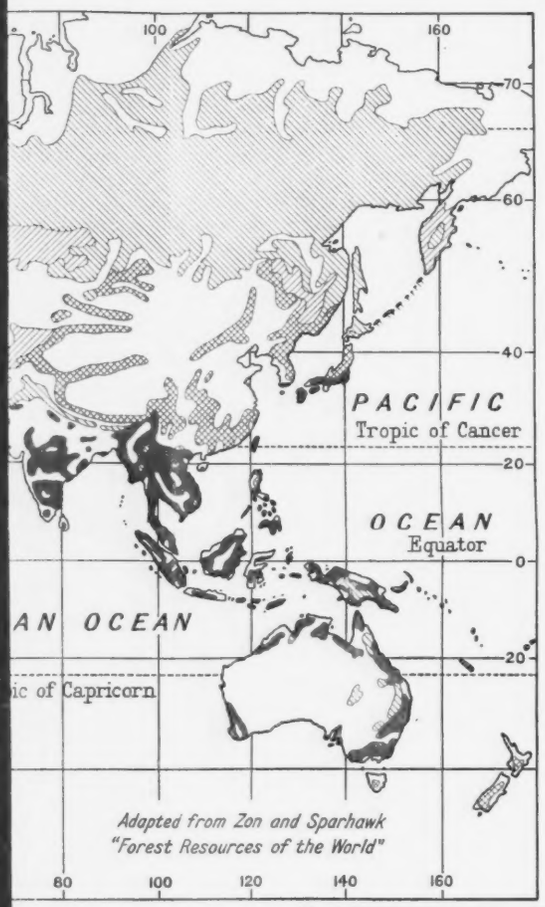
American, particularly United States, consumption of paper and other pulp products may well be approximated by the other advanced countries. The last column in the table shows the startling disparities in the present use of paper and pulp products; per person, North America uses more than 5 times as much as Europe, 21 times as much as South America, and more than 100 times as much as either Africa or Asia.

Where can additional supplies be sought? More than one-third of the earth's surface, exclusive of Antarctica, is classified as forested. Of this total of nearly 10 billion acres of forest, about one-third is considered unlikely to be commercially valuable, at least in the near future, because of adverse climate or site, or because of too poor or otherwise unsuitable stands; another third is classified as presently productive; and the remaining third, classed as potentially productive, is now almost wholly unexploited.

New supplies can come from three main sources: the reduction and prevention of waste in the producing forests; the use, or more intensive use, of hitherto neglected temperate species; and the opening up of hitherto unexploited regions.

Less than 750 million acres of the more than 3,350 million acres of forest now exploited are under any kind of systematic management. The rest are insufficiently protected, often entirely unprotected even against fire; cutting is unscientific; and replacement is not provided for. By expert management high yield can be combined both with sustained yield and with continuing improvement of quality.

Waste on a major scale occurs also in the utilization of wood after it is cut. It has been estimated that only one-third of all timber felled is now put to use. By proper integration of wood-using industries almost 100% could be utilized, as has been well demonstrated by a number of large producers. On the Pacific Coast of the United States, in the Douglas fir region, where the Weyerhaeuser Company operates several huge sawmills and pulpmills, not only is the wood



substance converted to lumber or pulp, but the bark is processed into such products as insulating board and wood wool, and the sawdust into cattle feed, fuel briquettes, and other articles.

Another example is found in southeastern Arkansas, where the Crossett Lumber Company owns nearly half a million acres of mixed southern yellow pine and hardwood forests. This company operates, in a single town, a softwood sawmill, a hardwood sawmill, and a pulpmill using thinnings from the pine forest, the waste from the pine sawmill, and some of the pulping hardwoods from its lands. In addition, it operates a hardwood distillation plant, using cull trees from the forest and leftovers from the sawmill. Many other companies in the United States are using leftovers, and other examples of a high degree of integration can be found in Canada and Scandinavia.

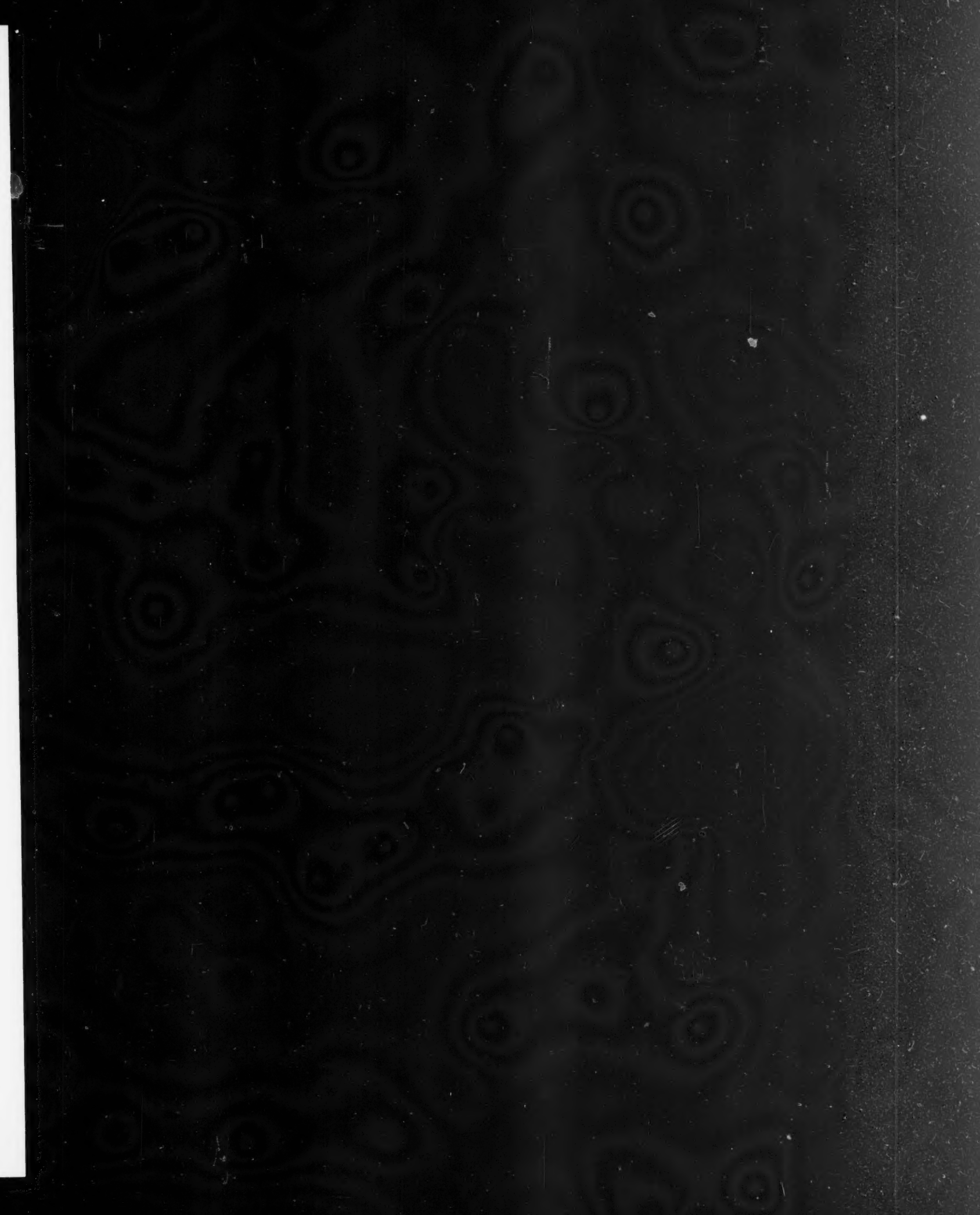
In many areas intensive, and successful, research is being conducted on hardwood pulping. The Brown Company, with holdings of half a million acres in New England, has pioneered in this field in its Berlin, N. H., laboratories, and now uses 60% of hardwood for pulping; all its pulp goes into the manufacture of plastics. The Union Bag and Paper Corporation of Savannah, Ga., with holdings of 700,000 acres, is manufacturing semichemical pulp from hardwood on a large scale. Another leader in the industry, the International Paper Company, typical of a number of similarly progressive firms, now employs, at its Natchez, Miss., mill a newly developed sulphate process that uses hardwoods in the manufacture of dissolving pulp.

Improving management and production practices, together with economic conditions that make it profitable to grow trees as a crop, give promise that

Average Annual Consumption Per Person of Wood and Chief Wood Products, 1947–49

Country	Fuelwood[1]	Industrial wood[2]	Lumber	Plywood	Pulp & pulp products
	(Cubic Meters of Roundwood)		(Cubic Meters of sawn wood)		(Tons)
Average of Countries Reporting	.26	.35	.15	.003	.021
Europe except U.S.S.R.	.42	.39	.13	.0027	.020
Finland	4.92	2.02	.33	.0061	.062
Sweden	1.82	1.76	.4	.0031	.082
United Kingdom	...	...	.14	.0044	.028
Italy	.24	.15	.047	.0014	.008
North and Central America	.39	1.63	.51	.0122	.105
Canada	1.66	2.42	.76	.0155	.081
U. S.	.35	1.69	.54	.012	.115
Cuba	.16	.21	.07	...	...
South America	1.2	.15	.05	.001	.005
Brazil	1.85	.13	.07	.0001	...
Chile	.66	.55	.09	.0011	.009
Colombia	.01	.05	.005	...	.002
Africa	.22	.04	.01	.0006	.001
Southern Rhodesia	1.27	.2	.035	.001	.005
French Cameroons	1.22	*	.005	...	...
Egypt	*	.04	.02	.0006	.002
Asia	.06	.05	.04	.0006	.001
Japan	.23	.24	.11	.0029	.005
Turkey	.19	.13	.013	.0003	.002
India	.02	.01	...	*	*
Oceania	.90	.93	.36	.0075	.043
Australia	1.04	1.06	.37	.0079	.044
New Zealand	.46	1.44	.59	.006	.037
Fiji	.20	.17	.09	...	...

... Data Unavailable; * Less than half the unit. [1] Includes wood for charcoal and distillation. [2] For a number of countries data for railroad ties are included with figures for lumber. Source: Adapted from FAO, *Yearbook of Forest Product Statistics, 1950.* Table 42.



the forests of the United States, as of Western and Central Europe, will be brought into and maintained at maximum productive capacity.

But most challenging to the pioneer spirit are the potential resources in the largely untouched forests of both the subarctic regions and the tropics—altogether, between 3¾ billion and 5 billion acres (the latter figure being the approximate area of the whole of North America north of the Rio Grande). Of these vast reserves, between 1,200 and 1,500 million acres are in the Northern Hemisphere: about 500 million acres in Canada; about 60 to 100 million acres in Alaska; and the remainder, the larger part, in the Soviet Union. The huge timber resources of the Yenisei Basin, in particular, with its chief mill centers now at Krasnoyarsk and Abakan, are being systematically opened up.

In Canada, about one-half of the merchantable timber, or some 250 million acres, is still beyond the reach of commercially profitable transportation. In Alaska, virgin timber of export quality covers less than 5 million acres in the relatively accessible southeastern part; the 60 to 100 million acres of "interior Arctic forest" are at present regarded as suitable chiefly for local use because of their uneven quality and the difficulty of access.

The undeveloped forests of the tropics present problems still to be solved. But solutions will certainly be found; for it is the tropical forests, and in particular those of Central and South America, that offer the world as a whole its best hope of great timber riches. The forests of Africa are somewhat less extensive than is commonly supposed, and, although Southeast Asia and its great archipelagoes are rich in forests, their mighty neighbors, China and India, are two of the world's wood-hungriest areas.

Utilization of these tropical reserves depends primarily on research. Up to now only a small number of the several thousand species have been adequately tested for commercial use, and because there are few homogeneous stands, much experimentation will be required before the highly mixed growths can be profitably logged by large-scale methods.

To sum up, the outlook for timber is, for the world as a whole, a short-term period of stringency. But if there be foresight, cooperative effort, and wise public and private investment, the long-term prospect is good. For forests are a self-renewing resource and, properly managed, will not only keep the world solvent in its multiple needs for wood but will bring increasingly into play their beneficent influences—their moderating effects on climate, their bulwark against flood and erosion, their gifts of refuge to wildlife and of recreation to city people.

S. H.-G.

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